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EXAMINER	
CURS, NATHAN M	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,590	WAKE ET AL.	
	Examiner	Art Unit	
	Nathan Curs	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21 recites the limitation "one optoelectronic transducer for converting optical data signals to radio frequency signals from the antenna". This language is confusing because it seems to be claiming that the signals coming from the antenna are optical.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 17 is rejected under 35 U.S.C. 102(b) as being anticipated by O'Shea (US Patent No. 6362906).

Regarding claim 17, O'Shea discloses a method for communicating between a central unit and at least one remote unit (fig. 9, elements 58 and 30), said method comprising: transmitting radiation from the central unit to the remote unit through an optical fiber power link to electrically power the remote unit (fig. 9, element 78 and col. 5, lines 48-61) receiving a radio

frequency signal from at least one antenna connected to the remote unit and converting the radio frequency signal to an optical data signal at the remote unit through an optoelectronic transducer (fig. 12, elements 22 and 106 and col. 10, lines 15-33); and transmitting the optical data signal to the central unit through an optical fiber data link (fig. 9, fiber from element 30 back to the receiver of element 58).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-4, 7-10, 12, 14-16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Shea (US Patent No. 6362906) in view of Miyazaki et al. ("Miyazaki") (US Patent Application Publication No. 2003/0118280).

Regarding claim 1, O'Shea discloses an optical communications system employing radio frequency signals (fig. 9 and col. 5, line 48 to col. 6, line 14), the system comprising: a central unit (fig. 9, element 58); at least one remote unit, said remote unit having at least one optoelectronic transducer for converting optical signals to radio frequency signals (fig. 9, element 30 and fig. 12, element 98 and 22 and col. 9, line 64 to col. 10, line 46) and converting radio signals to optical signals (fig. 12, elements 22 and 106 and col. 10, lines 15-33) and at least one antenna to receive and send radio frequency signals (fig. 12, element 22 and col. 9, line 64 to col. 10, line 14, where a dipole radiator is capable of both receiving and sending RF signals); at least one optical fiber link between the central unit and the remote unit for transmitting optical signals therebetween (fig. 9, element 84 and col. 5, line 48 to col. 6, line 14);

and at least one optical fiber power link between the central unit and the remote unit for providing electrical power at the remote unit (fig. 9, element 78 and col. 5, lines 48-61). O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional antennas/radiators for such applications as both transmitting and receiving signals (col. 1, lines 18-24), but does not clearly describe data on the optical signals sent optically from the central unit to the remote unit to be converted to RF signals at the remote unit of O'Shea's invention. However Miyazaki discloses transmitting RF signals optically from a central unit to a remote unit, where data is modulated on a portion of an optical signal sent from the central unit to the remote unit, where the remote unit does not have an independent power supply, and where one antenna at the remote unit is used for both transmitting and receiving RF signals at the remote unit by using different RF carrier frequencies for transmit and receive (fig. 7 and paragraphs 0003-0012). It would have been obvious to one of ordinary skill in the art at the time of the invention to modulate RF data signals on to the optical signals sent from the central unit to the remote unit of O'Shea and to use the antenna at the remote unit of O'Shea to both transmit and receive RF data, to enable the remote units of the aircraft or spacecraft of O'Shea to transmit RF data in addition to receiving RF data.

Regarding claim 2, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 1 wherein the at least one optoelectronic transducer comprises an electroabsorption transceiver (O'Shea: fig. 12, elements, 98 and 106).

Regarding claim 3, the combination of O'Shea and Miyazaki discloses the optical communications system according to claim 1 wherein the remote unit comprises a first optoelectronic transducer for converting optical data signals to radio frequency signals and a second optoelectronic transducer for converting radio signals to optical signals (O'Shea: fig. 12, elements, 98 and 106).

Regarding claim 4, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 3 wherein the first and second optoelectronic transducers are low power consumption devices (O'Shea: fig. 12, elements 98 and 106 and col. 7, lines 53-65 and col. 10, lines 47-64 and col. 11, lines 4-6, where the photodetector and Mach-Zehnder optical modulator are low power consumption devices).

Regarding claim 7, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 1 wherein the radio frequency signals are analog (O'Shea: col. 9, lines 36-50 and col. 10, lines 34-46, where AC RF signals are analog).

Regarding claim 8, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 1 wherein the optical fiber data link is uni-directional (O'Shea: fig. 9 and col. 5, line 48 to col. 6, line 14).

Regarding claim 9, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 8 wherein the uni-directional optical fiber data link is in a direction from the central unit to the remote unit (O'Shea: fig. 9, fiber from element 58 to element 30).

Regarding claim 10, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 8 wherein the uni-directional optical fiber data link is in a direction from the remote unit to the central unit (O'Shea: fig. 9, fiber from element 30 back to the receiver of element 58).

Regarding claim 12, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 1 wherein the radio frequency signals are used in a wireless communications system (O'Shea: fig. 12, element 22, where the antenna indicates wireless communication).

Regarding claim 14, the combination of O'Shea and Miyazaki discloses the optical communications system according to claim 1 and discloses bidirectional communication. O'Shea also discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional transmitting and receiving of RF signals from aircraft (col. 1, lines 18-24), but does not disclose that the remote unit comprises a first antenna to receive radio frequency signals and a second antenna to send radio frequency signals. However Miyazaki discloses transmitting RF signals optically from a central unit to a remote unit, where data is modulated on a portion of an optical signal sent from the central unit to the remote unit, where the remote unit does not have an independent power supply, and where an antenna at the remote unit is used for transmitting RF signals at the remote unit (fig. 7 and paragraphs 0003-0012). It would have been obvious to one of ordinary skill in the art at the time of the invention to modulate RF data signals on to the optical signals sent from the central unit to the remote unit of O'Shea and to use a transmit antenna at the remote unit of O'Shea to transmit RF data, to enable the remote units of the aircraft or spacecraft of O'Shea to transmit RF data in addition to receiving RF data.

Regarding claim 15, O'Shea discloses an optical communications system employing radio frequency signals (fig. 9 and col. 5, line 48 to col. 6, line 14), the system comprising: a central unit (fig. 9, element 58); at least one remote unit, said remote unit having means for converting optical signals to radio frequency signals and converting radio signals to optical signals (fig. 9, element 30 and fig. 12, element 98, 22 and 106 and col. 9, line 64 to col. 10, line 46) and at least one antenna to receive and send radio frequency signals (fig. 12, element 22 and col. 9, line 64 to col. 10, line 14, where a dipole radiator is capable of both receiving and sending RF signals); at least one optical fiber data link between the central unit and the remote unit for transmitting optical data signals therebetween (fig. 9, element 84 and col. 5, lines 48 to

col. 6, line 14); and at least one optical fiber power link between the central unit and the remote unit for providing electrical power at the remote unit (fig. 9, element 78 and col. 5, lines 48-61). O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional antennas/radiators for such applications as both transmitting and receiving signals (col. 1, lines 18-24), but does not clearly describe data on the optical signals sent optically from the central unit to the remote unit to be converted to RF signals at the remote unit of O'Shea's invention. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Miyazaki with O'Shea as described above for claim 1.

Regarding claim 16, O'Shea discloses a method for communicating between a central unit and at least one remote unit (fig. 9, elements 58 and 30), said method comprising: transmitting an optical signal from the central unit to the remote unit through an optical fiber link (fig. 9, element 84 and col. 5, line 48 to col. 6, line 14) and transmitting radiation from the central unit to the remote unit through an optical fiber power link to electrically power the remote unit (fig. 9, element 78 and col. 5, lines 48-61); and converting the optical signal to a radio frequency signal at the remote unit through an optoelectronic transducer (fig. 9, element 30 and fig. 12, element 98 and 22 and col. 9, line 64 to col. 10, line 46). O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional antennas/radiators for such applications as both transmitting and receiving signals (col. 1, lines 18-24), and discloses a dipole antenna at the remote unit (fig. 12, element 22 and col. 9, line 64 to col. 10, line 14, where a dipole radiator is capable of both receiving and sending RF signals), but does not clearly describe data on the optical signals sent optically from the central unit to the remote unit to be converted to RF signals sent into free space at the remote unit of O'Shea's invention. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Miyazaki with O'Shea as described above for claim 1.

Regarding claim 21, O'Shea discloses a remote unit in an optical communications system employing radio frequency signals (fig. 9, element 30 and fig. 12 and col. 9, line 36 to col. 11, line 6), said remote unit connected with a central unit via at least one optical fiber (fig. 9, elements 58 and 30) and comprising: at least one antenna to receive and send radio frequency signals (fig. 12, element 22 and col. 9, line 64 to col. 10, line 14, where a dipole radiator is capable of both receiving and sending RF signals); at least one optoelectronic transducer for converting optical signals to radio frequency signals for the antenna and for converting radio signals to optical signals for transmission to the central unit (fig. 9, element 30 and fig. 12, element 98, 22 and 106 and col. 9, line 64 to col. 10, line 46); and means for converting radiation transmitted from the central unit to electrically power the remote unit (fig. 12, element 102 and col. 9, lines 36-50). O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional antennas/radiators for such applications as both transmitting and receiving signals (col. 1, lines 18-24), but does not clearly describe data on the optical signals sent optically from the central unit to the remote unit to be converted to RF signals at the remote unit of O'Shea's invention. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Miyazaki with O'Shea as described above for claim 1.

7. Claims 5, 6, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Shea (US Patent No. 6362906) in view of Miyazaki (US Patent Application Publication No. 2003/0118280), as applied to claims 1-4, 7-10, 12, 14-16 and 21 above, and further in view of Tsuji et al. ("Tsuji") (US Patent No. 5664035).

Regarding claim 5, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 4, but discloses that the second optoelectronic

transducer comprises a Mach-Zehnder modulator instead of a VCSEL laser. However, Tsuji discloses an optical powered transmission system where the optically powered remote unit uses a laser to communicate back to the central unit, the laser operating based on electrical power converted from the received optical power signal coming from the central unit (fig. 1 and col. 5, lines 19-28). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a laser as an engineering design choice in implementing the transducer already disclosed for the combination of O'Shea and Miyazaki. Consider the teachings of both O'Shea and Tsuji, it's clear the type of transducer claimed merely amounts to the selection of expedients known as design choices to one of ordinary skill in the art. Further, the official takes official notice that VCSEL lasers are well known as low-power lasers for optical communications. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a VCSEL laser in implementing a laser transducer for an optically powered remote unit, to provide the advantage of lower power consumption, since the remote unit doesn't have an internal power supply.

Regarding claim 6, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 3, but discloses that the second optoelectronic transducer comprises a Mach-Zehnder modulator instead of an edge-emitting laser. However, Tsuji discloses an optical powered transmission system where the optically powered remote unit uses a laser to communicate back to the central unit, the laser operating based on electrical power converted from the received optical power signal coming from the central unit (fig. 1 and col. 5, lines 19-28). Further, the office takes official notice that edge-emitting lasers are well known for as laser for optical communications. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an edge-emitting laser as an engineering design choice in implementing the transducer already disclosed in the combination

of O'Shea and Miyazaki. Consider the teachings of both O'Shea and Tsuji, it's clear the type of transducer claimed merely amounts to the selection of expedients known as design choices to one of ordinary skill in the art.

Regarding claim 11, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 1 but does not disclose that an optical fiber transports both the optical fiber data link and the optical fiber power link using wavelength division multiplexing. Tsuji discloses an optical powered transmission system where the optical data signal and optical power signal are sent to a remote unit using wavelength division multiplexing (fig. 1 and col. 4, lines 25-54 and col. 5, lines 26-28). It would have been obvious to one of ordinary skill in the art at the time of the invention to use optical data and optical signals of different wavelengths and wavelength division multiplexing in the system of the combination of O'Shea and Miyazaki, based on the teaching of Tsuji, to provide the benefit of reducing the numbers of optical fibers required between the central and remote units.

Regarding claim 13, the combination of O'Shea and Miyazaki discloses the optical fiber communications system according to claim 12 but does not explicitly disclose that the radio frequency signals comprise multiple radio carriers within multiple frequency bands with multiple protocols. However, O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47). The office takes official notice that spacecraft and aircraft conventionally use radio frequency signals comprising multiple radio carriers within multiple frequency bands with multiple protocols. It would have been obvious to one of ordinary skill in the art at the time of the invention that the radio frequencies of O'Shea used for spacecraft or aircraft communications would comprise multiple radio carriers within multiple frequency bands with multiple protocols, to enable the system to be in communication with devices that communicate with spacecraft or aircraft.

8. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Shea (US Patent No. 6362906) in view of Miyazaki (US Patent Application Publication No. 2003/0118280) as applied to claims 1-4, 7-10, 12, 14-16 and 21 above, and further in view of Specht (US Patent No. 6414958).

Regarding claim 18, O'Shea discloses an optical communications system employing radio frequency signals (fig. 9 and col. 5, line 48 to col. 6, line 14), the system comprising: a central unit (fig. 9, element 58); at least one remote unit, said remote unit having means for converting optical signals to radio frequency signals and converting radio signals to optical signals (fig. 9, element 30 and fig. 12, element 98, 22 and 106 and col. 9, line 64 to col. 10, line 46), and at least one antenna to receive and send radio frequency signals (fig. 12, element 22 and col. 9, line 64 to col. 10, line 14, where a dipole radiator is capable of both receiving and sending RF signals); at least one optical fiber data link between the central unit and the remote unit for transmitting optical signals therebetween (fig. 9, element 84 and col. 5, line 48 to col. 6, line 14); and at least one optical fiber power link between the central unit and the remote unit for providing electrical power at the remote unit (fig. 9, element 78 and col. 5, lines 48-61). O'Shea discloses using the system in a spacecraft or aircraft application (col. 5, lines 28-47), and describes conventional antennas/radiators for such applications as both transmitting and receiving signals (col. 1, lines 18-24), but does not clearly describe data on the optical signals sent optically from the central unit to the remote unit to be converted to RF signals at the remote unit of O'Shea's invention. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Miyazaki with O'Shea as described above for claim 1. The combination of O'Shea and Miyazaki discloses means for converting optical data signals into baseband signals and converting baseband signals to optical data signals (O'Shea: col. 10,

lines 34-46 and Miyazaki: paragraphs 0008-0010, as applicable in the combination), but does not disclose that the baseband signals are digital signals. Specht discloses Ethernet over RF between central units and satellite units (fig. 7 and col. 10, lines 14-53). It would have been obvious to one of ordinary skill in the art at the time of the invention to use Ethernet over RF for the combination of O'Shea and Miyazaki, to provide the benefit of geographically expanded LAN communications.

Regarding claim 19, the combination of O'Shea, Miyazaki and Specht discloses the optical fiber communications system according to claim 18 wherein the baseband digital signals are used in a local area network protocol (Specht: fig. 7 and col. 10, lines 14-53).

Regarding claim 20, the combination of O'Shea, Miyazaki and Specht discloses the optical fiber communications system according to claim 19 wherein the local area network protocol is Ethernet (Specht: fig. 7 and col. 10, lines 14-53).

Conclusion

9. Any inquiry concerning this communication from the examiner should be directed to N. Curs whose telephone number is (571) 272-3028. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached at (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (800) 786-9199.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pairdirect.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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